

REMARKS

The specification has been amended to correct typographical errors; claims 1, 2, 7, 10, and 18 have been amended. Claims 1-20 remain pending in the captioned case. Further examination and reconsideration of the presently claimed application are respectfully requested.

Section 112 Rejection

Claims 5-6 were rejected under 35 U.S.C. § 112, first paragraph. The Office Action alleges that the specification does not disclose the limitations set forth in claims 5 and 6. Applicant respectfully disagrees. The specification as originally submitted describes a holder 260 that receives and retains an outer perimeter of a frontside surface of an inverted wafer 225 (Specification -- pg. 9, lines 17-19; Fig. 2; pg. 11, lines 23-24; Fig. 3). Moreover, the outer perimeter is retained using either attachment tabs or by applying vacuum pressure to the outer perimeter of the frontside surface of wafer 225 (Specification -- pg. 9, lines 19-21; Fig. 2; pg. 11, lines 24-26; Fig. 3).

Therefore, Applicant respectfully traverses the allegation made in the Office Action that the specification does not disclose (i) "where in the holder is adapted to receive an outer perimeter of the wafer frontside surface by applying vacuum pressure thereto" as recited in claim 5; and (ii) "wherein the holder is adapted to receive an outer perimeter of the wafer frontside surface by tabs arranged intermittently around the outer perimeter" as recited in claim 6.

Section 102 Rejection

Claim 1-4 and 7-20 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,493,236 to Ishii et al. (hereinafter "Ishii"). The standard for "anticipation" is one of fairly strict identity. A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art of reference. *Verdegaal Bros. v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987); MPEP 2131. Furthermore, anticipation requires the presence in a single prior art reference disclosure of each and every element of the claimed invention, as arranged in the claim. *W.L. Gore & Assocs. V. Garlock*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983). Using these standards, Applicants submit the cited art fails to disclose each and every element of the currently pending claims, some distinctive features of which are set forth in more detail below.

Ishii does not teach or suggest, nor can it be modified to teach or suggest, an inverted wafer or an arrangement whereby a probe needle is placed below and an optical scan mechanism placed above the inverted wafer. Present claims 1 and 10 each define an inverted wafer configuration. Specifically, the backside surface of the wafer faces upward and the frontside surface of the wafer faces downward. The upward-facing, backside surface is thereby presented to an optical scan mechanism arranged above the wafer. The downward-facing, frontside surface is thereby presented to a probe needle arranged below the wafer.

By inverting the wafer and arranging the scan mechanism above and probe needles below the wafer, the presently claimed test apparatus purposely avoids “inverting the microscope (or optical scan mechanism). As recited in the Background section of the present specification, it is desirable to avoid the pitfalls of reconfiguring a test apparatus, as in Ishii. Conventional test apparatus do not invert the wafer, but instead probe and scan the frontside surface with the backside surface mounted to a chuck (Specification -- pg. 6, lines 20-23; Fig. 1a). As noted in Ishii as well as the present specification, frontside probing and frontside scanning is difficult if the frontside surface is quite dense (Specification -- pg. 2, lines 1-7). While frontside probing using probe needles is a necessity, backside scanning and viewing using a microscope was recognized as an enhancement to wafers having densely-patterned metal conductors on the frontside surface (Specification -- pg. 2, lines 27-30). Backside viewing with, for example, a microscope unfortunately involves inverting the microscope so that the microscope is below and peers upward through an opening within the chuck. The microscope, being beneath the wafer, views the backside surface of the wafer while the frontside surface extends upward in a non-inverted fashion, and is probed by probe needles that are above the wafer. This is how Ishii mandates the probe/scan configuration -- with the wafer in a non-inverted position and the probe needles above and the microscope (or scan mechanism) below the wafer. The present specification clearly points out that this is a non-desired configuration. “The desired backside viewing should be accomplished by inverting the wafer instead of inverting the microscope, because inverting the microscope would further require re-engineering of the existing frontside viewing automated probe stations to allow for an unobstructed view of the backside surface of the wafer.” (Specification -- pg. 2, line 30 - pg. 3, line 3.)

To be more specific, by not inverting the wafer, the test apparatus must be substantially modified so that not only must the test head have an opening, but the chuck support member must also have an opening. (See Ishii -- col. 5, lines 54-60, describing the redesigned “ring-like test head [40b] . . . [with] a through hole . . . in the . . . test head 40b;” Fig. 1.) Not only must the test head be completely redesigned, but the chuck of

Ishii must also be redesigned. (See Ishii -- Fig. 1, showing wafer chuck 21 with an opening therethrough in order to allow optical microscope 30 to view the backside surface.) By not having to modify the probe head so that it has an opening therethrough, the present test apparatus and holder are "well-suited to operate upon legacy devices, yet can achieve the aforementioned benefits in an automated setting." (Specification -- pg. 14, lines 29-30.) By not having to switch over between a conventional test head used in production probing of wafers to a specialized through-hole test head for testing only a portion of a wafer, the present claims are drawn away from Ishii. Specifically, as will be described below, Ishii's specialized test head is used for only testing a portion (or area) of a wafer after the wafer has been production tested. This two-step approach of first testing in a production setting and thereafter testing using the specialized test apparatus of Ishii is eliminated from the present claimed device.

Ishii does not teach or suggest, nor can it be modified to teach or suggest, moving a wafer the width of a die to all neighboring die across the entire wafer in a step-and-repeat fashion. Present claims 7, 10, and 18 describe the production test methodology, whereby a chuck (and attached wafer) is moved one die position and that die is tested. Thereafter, the wafer moves again one die position to the neighboring die which is then tested. This process is repeated in a step-and-repeat fashion across the entire wafer. Ishii cannot implement a step-and-repeat production test methodology using the test apparatus shown. Specifically, Ishii describes a particular test analysis that must be undertaken as a two-step process. First, a test program is applied to the various die using, for example, a step-and-repeat process (Ishii -- col. 7, line 66 - col. 8, line 1). Based on that test outcome, a portion (or area) of a defective die can be determined (Ishii -- col. 8, lines 1-9). It is only after that defective area is determined that the test apparatus using OBIC analysis of Ishii is applied "for testing only a defective area." (Ishii -- col. 8, lines 9-14; col. 8, line 18.) By isolating and only testing the defective area, "it is possible to increase the S/N ratio for detecting OBIC current or a flash in a luminous analysis . . ." (Ishii -- col. 8, lines 21-23.) Thus, unlike conventional tests, the test apparatus of Ishii is applied to only a portion of a semiconductor wafer, not to each die progressing from neighboring die to neighboring die across the entire wafer as presently claimed. In fact, throughout Ishii, it is clear that the test is only applied to a portion of a die, not to each and every die in a production setting (Ishii -- col. 3, line 60; col. 4, line 14; col. 4, line 23; etc.)

Since Ishii only tests a portion of one die or possibly a limited set of die across a wafer, the test apparatus of Ishii cannot and does not cause a wafer to move the width of a die so that all neighboring die across the entire wafer are tested in a step-and-repeat fashion as claimed.

Ishii does not teach or suggest placing a positioning camera below the probe needle. Present claim 2 has been amended to recite a positioning camera placed below the probe needle. In Ishii, the positioning camera or microscope 50 is purposely placed through the through-hole opening of probe head 40b so that it is above the probe needle 45 (Ishii -- Fig. 1). If the positioning camera 50 was not placed above the probe needle, then there would be no need for explicitly requiring an opening within probe head 40 through which positioning microscope 50 can peer. Thus, there would be no incentive or motivation for one skilled in the art when reading Ishii to eliminate the through-hole opening, or to place the positioning camera on the opposite side of the wafer. To do so, the positioning camera would no longer be on the same side of the wafer as the probe needles -- thus, positioning could never be effectuated.

For at least the reasons stated above, it is asserted that independent claims 1, 10, and 18, as well as claims dependent therefrom, are not anticipated by the cited art. Applicant respectfully requests removal of this rejection.

Section 103 Rejection

Claims 5 and 6 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Ishii in view of U.S. Patent No. 5,959,461 to Brown et al. (hereinafter "Brown"). To establish a case of *prima facie* obviousness of a claimed invention, all of the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (C.C.P.A. 1974), MPEP 2143.03. Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so. *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed.Cir. 1988); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992), MPEP 2143.01. Using these standards, Applicants contend that the cited art fails to teach or suggest all features of the currently pending claims.

The Office Action notes that Brown discloses a holder 34 adapted to receive an outer perimeter of wafer 50 frontside surface by applying vacuum pressure thereto (Office Action -- pg. 4). The Office Action refers to col. 4, lines 42-53 of Brown for support of its contention. However, upon reviewing the cited reference, there is no reference whatsoever of an outer perimeter frontside surface being retained by a vacuum pressure applied thereto. While Brown appears to indicate tabs (Brown -- Fig. 5), it is unclear whether tabs 54 bear against the frontside or backside outer perimeter of a wafer.

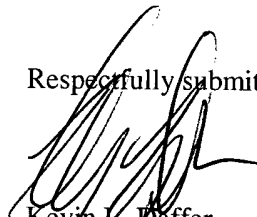
For at least the reasons stated above (as well as those stated in response to the § 102 rejection), it is asserted that independent claims 1, 10, and 18, as well as claims dependent therefrom, are not anticipated or rendered obvious by the cited art. Applicant respectfully requests removal of this rejection.

CONCLUSION

This response constitutes a complete response to the issues raised in the Office Action mailed March 31, 2003. In view of remarks traversing the rejections presented therein, Applicants assert that claims 1-20 are in condition for allowance. If the Examiner has any questions, comments, or suggestions, the undersigned attorney earnestly requests a telephone conference.

No fees are required for filing this amendment; however, the Commissioner is authorized to charge any additional fees which may be required, or credit any overpayment, to LSI Logic Corp. Deposit Account No. 12-2252/01-006.

Respectfully submitted,



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